

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

COMPLETION OF FILING NATIONAL PHASE OF PCT APPLICATION
UNDER RULE 35 USC 371 AND 37 CFR 1.494(C) OR 1.495(C)

BOX PCT

COMPLETION
For PCT Cases Only

In re PATENT APPLICATION of

Inventor(s): LAUKKANEN

Appln. No.:	09	000,288
	Series Code ↑	Serial No. ↑

Atty. Dkt.	PMS	244704	P32984US00
		M#	Client Ref

National Phase Field

Based on **PCT** | **SE96** | **00865**
 ↑ Country Code

(Our Deposit Account No. 03-3975)

(Our order No.	70051	244704
ICATIONS	C#	M#

Title: ARRANGEMENT FOR WIRELESS COMMUNICATIONS

Date: May 5, 1998

FILING OF ITEM(S) LATE IN PCT/USA NATIONAL CASE

Hon. Commissioner of Patents
and Trademarks
Washington, DC 20231

Sir:

The following completes the filing of the subject application under Rule 494(c)/495(c). Please accept the following attached items:

1. Missing Requirements Notice (PCT/DO/EO/905) ☒ copy attached ☐ not yet received
2. ☒ **Signed Declaration** ☒ Original ☐ Facsimile/Copy ☐ with spec/claims attached
3. ☐ **Translation** of the International Application into English including:
- a. ☐ Request; b. ☐ Abstract
- c. ☐ pgs. Spec. and Claims; d. ☐ Translation verification
- e. ☐ sheets Drawing which are: ☐ informal ☐ formal of size ☐ A4 ☐ 11"
4. ☐ a copy of **International Search Report (ISR)** attached (☐ page(s))
- a. ☐ plus Annex of family members (☐ page(s))
5. **Information Disclosure Statement** including
- a. ☐ From PTO-1449 listing documents
- b. ☐ Copies of document(s) listed on Form PTO-1449
- c. ☐ A concise explanation of ISR references is given in the ISR
6. ☐ **Assignment** and cover sheet. Please return the recorded assignment to the undersigned.
7. ☐ Copy of Power to international application agent.
8. ☐ (No.) Verified Statement(s) establishing "small entity" status under Rules 9 & 27.
9. ☐ Formal Drawings: ☐ sheet(s) ☐ informal; ☐ formal of size: ☐ A4 ☐ 11"
10. ☐ Please immediately start national examination procedures (35 USC 371(f))

11. ☐ Attached:
12. ☐ Preliminary Amendment:
13. ☒ Basic U.S. National fee per Rule 492(a)(1)-(4) was previously timely filed.:
14. **Calculation of remaining fees due (if any):** based on amended claim(s) per above item
☐ 12 (above) or item(s) in PAT-112 (filed previously) ☐ 12 ☐ 14 ☐ 17 ☐ 25
15. **CLAIMS FEES** ☒ previously paid ☐ paid herewith as follows:

				Large/Small Entity		Fee Code	
16. Total Effective Claims	7	minus 20 =	0	x \$22/\$11	+0	966/967	
17. Independent Claims	1	minus 3 =	0	x \$82/\$41	+0	964/965	
18. If <u>any proper</u> multiple dependent claim (ignore improper) is present,				\$270/\$135	+0	968/969	
19. Filing Declaration late, fee paid <input type="checkbox"/> previously <input checked="" type="checkbox"/> now				\$130/\$65	+130	154/254	
20. SUBTOTAL					\$130		
21. Original due date: May 6, 1998							
22. Petition is hereby made to extend the <u>original</u> due date to cover the date this response is filed for which the requisite fee is attached				(1 mo)	\$110/\$55 =	+0	115/215
				(2mos)	\$400/\$200 =		116/216
				(3mos)	\$950/\$475 =		117/217
				(4mos)	\$1510/\$755 =		118/218
23. If "non-English" box 3 is X'd, add Rule 17(k) processing fee				\$130	+0	139	
24. If "assignment" box 6 is X'd, add recording fee.				\$40	+0	581	
25. TOTAL FEE ENCLOSED =					\$130		

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown in the heading hereof for which purpose a duplicate copy of this sheet is attached.

This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed.

1100 New York Avenue, N.W.
 Ninth Floor East Tower
 Washington, D.C. 20005-3918
 Tel: (202) 861-3000
 DWB/rgf

Pillsbury Madison & Sutro LLP
 Intellectual Property Group

By: Atty: David W. Brinkman

Sig: 

Reg. No. 20817

Fax: (202) 822-0944

Tel: (202) 861-3033

NOTE: File in duplicate with PTO receipt (PAT-103A) and attachments

25.5 Per item 17.c3, **cancel original** pages # _____, claims # _____, Drawing Sheets # _____

PAT-112 11/97

WQ 97/03532

09/000288
PCT/SE96/00865

88 Rec'd PCT/PTO 07 JAN 1998

1

ARRANGEMENT FOR WIRELESS COMMUNICATIONS

FIELD OF INVENTION

5 The present invention relates to a wireless communications arrangement or system with inbuilt integrated electronics, said arrangement being connected to a host unit via connection means. More specifically, the invention relates to an
10 arrangement or system which relieves a connected host unit from context switching procedures, unnecessary processing of disturbance and interference signals and work-demanding interruption routines in the direct wireless exchange of information at relatively short distances between host units via arrangements in accordance with the invention.

15

DESCRIPTION OF THE BACKGROUND ART

Known arrangements for wireless communications with direct signal transmission between communications units - i.e. in
20 the absence of intermediate active transmission systems such as mobile telephone systems for processing or forwarding signals, such as PCs or other host computers, printers, facsimile equipment or other communications units - include equipment for the wireless transmission of data, for instance
25 IR equipment, radio equipment or ultrasonic equipment. This equipment is, in turn, controlled and operated by communications protocol, error correcting routines and possibly routines for signal disturbance filtration of wireless transmitted signals, these routines and protocols being
30 present in said communications units.

It will be understood that, for instance, a mobile telephone system is not accessible for the transmission of information between, e.g., arrangements where communication shall often
35 be instantaneous with large quantities of data and at high speeds. It would untenable to expect access to a mobile telephone system for transmission purposes. Often no unoccu-

WO 97/03532

PCT/SE96/00865

2

pied channels are available and the mobile telephone traffic varies throughout a calendar day.

Protocol, routines and hardware integrated in communications units for wireless transmission require a high degree of computer power, which steals memory space and time for other processing in communications units; received signals shall often be converted to an ASCII code or other standard alphanumeric character codes with control characters.

Furthermore, in communications units with integrated wireless communication the receiver of wireless transmitted signals operates continuously with the interpretation of outer disturbances, interferences, and noise, wherewith the communications unit or host unit operates continuously and unnecessarily with interpretation, even though the signals are shown to be noise. Such disturbance sources and noise sources may, for instance, consist of the remote controls of other apparatus, such as TV apparatus, lighting controls, cordless telephones, etc.

The aforesaid circumstances constitute a problem in existing known wireless communication arrangements or systems with respect to rapid and effective transmission of information.

25

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an effective solution to the aforesaid problem with regard to the rapidness and effectiveness of direct communication between communications units in the absence of processing via intermediate, active link systems which forward signals in the digital transmission of data between communications units.

35

A first alternative embodiment of the invention involves using means for signal conversion in the arrangement solely

WO 97/03532

PCT/SE96/00865

3

for filtering disturbances in received wireless-transmitted signals (pulses), wherein communications protocol is included in the host unit to which the arrangement is connected.

5 In a second alternative embodiment of the invention, there is provided a separate external arrangement which in wireless transmission performs all signal processing externally of a host unit, wherein only signals between the host unit and the inventive arrangement are transmitted in the form of alphanu-
10 merical codes with control characters, preferably binary characters.

15 An object of the invention is also to connect an inventive arrangement to a host unit via standard host unit input and output ports.

20 Yet another object of the invention is to enable a host unit connected to an inventive arrangement to maintain communication between other external units in a conventional manner, for instance via local network connections through the medium of connection means, therewith enabling the wireless transmission to be applied without disturbing or delaying other communication, when applicable.

25 The objects of the invention are achieved with an arrangement for wireless communication having inbuilt integrated electronics and being connected to a host unit via connection means.

30 The arrangement includes process-controlled integrated electronics with transmitter means and receiver means, said means functioning to establish a direct transmission link with other means for wireless pulse transmission and wireless pulse reception respectively, means for filtering out
35 disturbance data and noise, signal conversion means, and input and output ports for connection to the host unit through the medium of connection means. The arrangement

WO 97/03532

PCT/SE96/00865

4

including said filter means operates as a buffer to the host unit, insomuch that the host unit receives and processes via said connection means solely data intended for the host unit.

5 In one embodiment of the invention, the arrangement may include protocol control means for transmitting and receiving data between integrating devices and between the host unit, wherein the arrangement converts received wireless-transmitted data to an alphanumeric character code optionally with
10 control characters for transmission to the host unit, or converts alphanumeric character codes received from the host unit and possibly including control characters to pulses for wireless transmission. The arrangement thus operates autonomously from the host unit concerned with regard to wireless
15 transmission and its signal conversion.

When a host unit has an inventive arrangement connected thereto, the unit will use the arrangement on an intermittent basis and other existing network connections continuously,
20 or, alternatively, the unit will determine when and to which extent the arrangement is used in relation to other existing network connections.

Alternatively, the arrangement may constitute the sole
25 communication path of a host unit for external communication.

It is preferred that the arrangement is portable when not integrated in a host unit, and that the arrangement can be connected to a host unit via standard I/O ports of said unit
30 and said arrangement without needing to supplement the host unit with wireless communication software.

BRIEF DESCRIPTION OF THE DRAWING

35 The present invention will now be described in more detail with reference to the accompanying drawing, in which

WO 97/03532

PCT/SE96/00865

5

Fig. 1 illustrates schematically a communications link for the wireless transmission of digital data with an inventive arrangement in the form of a black box; and

5 Fig. 2 is a block schematic illustrating a communications link for the wireless transmission of digital data in accordance with the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

10

With the intention of solving the aforesaid problems and achieving the aforesaid objects by means of the present invention, there is used an arrangement which operates completely or partially externally of host communications units, as described below.

15

20

In this regard, Fig. 1 illustrates schematically a communication link 9 for the direct wireless transmission of digital data, having two inventive arrangements 12 in the form of black boxes connected to a communications unit 10 through the medium of connection means, in the illustrated case a data cable 14.

25

30

35

By direct transmission is meant here that no intermediate active systems receive transmitted signals and forward said signals to intended receivers. Active systems such as mobile telephone systems involve the transmission of data via intermediate systems, such as base stations and switching centres for forwarding signals to the receiver, which also involves extra costs for using the mobile telephone system. The present invention relates, e.g., to two computers which are often located at a relatively short distance apart and which communicate with each other, often in the same room, and consequently direct communication between the computers via an active intermediate system or an active intermediate link would only incur unnecessary costs in respect of equipment, subscription fees, etc., and considerably higher

WO 97/03532

PCT/SE96/00865

6

loading of the active system, which often has a limited number of channels. Thus, transmitter and receiver in communicating arrangements according to the invention establish an individual direct communications link which can

5 use passive reflectors for transmission, e.g. walls, ceilings, roofs, parabolic reflectors, mirrors, etc. The present invention provides practically immediate access to a data transmission, particularly when the access times are compared with the access times applicable in mobile telephone systems.

10 It will be understood that a mobile telephone system is not accessible for the transmission of information between, e.g., devices where communication shall often take place instantaneously and with large quantities of data and at high speeds. It would be untenable to expect access to a mobile telephone

15 system for transmission purposes. Often, no unoccupied channels are available and the traffic over mobile telephone systems varies throughout a calendar day.

Furthermore, indoor coverage for mobile telephone systems is

20 highly doubtful, particularly in windowless spaces. The present invention also provides an improvement in existing wireless transmission systems that do not utilize an active intermediate system.

25 The connection means may be a data cable with standard electric contacts for mounting base connections, soldered for integrated connection of the host unit 10, adapters for direct, integrated, connection to a host unit 10, and so on. The arrangement 12 may thus also be integrated in a host unit

30 in a manner known to the skilled person, via connection means 14. The link 9 is intended for the transmission of data between the arrangements 12, as indicated by the unidirectional arrows in Fig. 1. The distance between the arrangements 12 may vary between about 0.5 m to several 100 meters,

35 indicated by the two-directional arrows in Fig. 1. The arrangements 12 need not necessarily be directly visible to one another, and reflectors (not shown), mirrors or other

WO 97/03532

PCT/SE96/00865

7

reflective surfaces may be used to reflect light, radio waves, ultrasonic signals, etc.

5 The wireless transmitter units may be directed more or less divergently adapted or omnidirectional.

Communication between the arrangements 12 may be two-directional or unidirectional in both directions, such as duplex, full duplex and simplex communication.

10

The two arrangements 12 both transmit and receive data in pulse form, such as light, radio or ultrasonic pulses, depending on the wireless transmission technique used. Although infrared light (IR light) is the most obvious choice with regard to light pulses, this does not exclude the use of other optical light transmitting techniques.

15

The arrangements 12 are constructed to filter-out transmission disturbances and noise via an internal filtering program or via internal hardware, so that erroneous information will be sorted out or errors corrected with the aid of typical codes for the transmission of wireless digital data, for instance with the aid of known CRCs (Cyclic Redundancy Codes) for error-free transmission of received data to host units 10.

20

25

A host unit 10 may comprise a PC, another host computer, or communications units that include integrated processor-based electronics for communication with other units. These communication units 10 are herewith able to maintain the transmission of information in a typical manner via cables or other connection means in, e.g., a network of units 10, wherein a connected arrangement 12 can be used for the intermittent transmission of data when so required. This last mentioned intermittent use of a connected arrangement may be due to a number of reasons, for instance the transmission of data to another network, the replacement of modem transmis-

30

35

00000200 "050530"

WO 97/03532

PCT/SE96/00965

8

sion between freestanding PC units, the use of specific peripheral equipment control functions, etc.

5 The exchange of information between external arrangements 12 and host unit 10 through data cable 14 may be effected, e.g., in a serial RS232 channel or some other suitable standard serial or parallel data channel. The cable 14 is connected between host unit 10 and arrangement 12 via one or more standard serial or parallel input and output ports (I/O ports).

15 Reference is now made to Fig. 2, which is a block schematic illustrating a communications link 9 having two arrangements 12 for the wireless transmission of digital data in accordance with the present invention.

20 The inventive arrangement 12 is comprised of integrated processor-based 20 electronics and the central processor unit (CPU) has integrated therein filter means 26, software or hardware for data flow filtration, error correction and protocol handling. The CPU (central processor unit) has a transmitter means 22 connected to a receiver means 24 via the filter means 26. Naturally, the filter means 26 may be a device located externally of the CPU and connected between 25 said unit 20 and the receiver means 24. The CPU is also connected to signal conversion means 28 which converts signals to a form intended for the transmission of data between arrangements 12 and host units 10 respectively.

30 Although not shown, the CPU includes typically I/O ports for communication on a worldwide basis and to which the cable connection 14 is connected via an appropriate standard mounting base (not shown).

35 Units and means and the communication technology employed therebetween, this technology being included in the arrangement 12, are well known in the present technical field and

WO 97/03532

PCT/SE96/00865

9

do not therefore need to be described in detail in order for one skilled in this art to practice the invention. On the other hand, the combination of means and units localized in an arrangement 12 for an external host unit 10 is unique, wherein the host unit 10 in one embodiment greatly relieves time-consuming transmission and reception tasks that load interruption routines and context switching (data term for switching between working routines) for CPU-based communications units 10, while these tasks are totally obviated in a second embodiment. In a first embodiment of the invention, the arrangement 12 includes the filter means 26 having filtering protocol but lacks the communications protocols that host units 10 usually communicate with externally, in other words host units must continue to include such protocol in order to satisfy the object of the invention.

The means 26 for filtering-out disturbing or interfering data constitutes an essential part of the invention. It will be understood that a wireless communication unit 10 which communicates in accordance with present techniques is constantly required to interpret interference noise from apparatus in its surroundings, such as noise from TV remote controls, radio transmitting apparatus, e.g. mobile telephones, etc. This requires the unit 10 to interpret continuously signals arriving at the receiver and deciding whether the data is relevant data or interference data. An arrangement 12 which includes filter means 26 for filtering-out disturbance data and interference data completely relieves a connected host unit 10, which is then able to rest while awaiting the arrival of relevant, filtered data.

In another embodiment, the arrangement 12 also includes the aforesaid communications protocols that a host unit connected to the arrangement 12 will normally include and which thus operate fully autonomously from concerned host units 10 with respect to the data processing of transmission and reception signals.

WO 97/03532

PCT/SE96/00845

10

An arrangement 12 according to the second embodiment includes protocol handling of data for known alphanumerical character codes with control characters in the arrangement 12. Thus, a host unit is able to send and receive, via data cable 14, alphanumerical text files with control characters, e.g. ASCII characters, directly to/from the external arrangement without needing to process received data more than is required for internal data processing reasons.

10 As before described, host units 10 are still able to communicate via conventional network connections, wherein specific applications may enable parts of the network communication to take place via the external wireless communication arrangement 12 between host units 10 when necessary.

15 When a host unit 10 wishes to communicate with another host unit, information is sent, e.g., to the input port of said other host unit via a serial RS232 channel. The transmitting arrangement converts the information arriving from its host unit into a pulse train of electromagnetic signals, or in applicable cases into pulse trains of acoustic signals and sends the pulse trains via the wireless link to a similar arrangement 12 which is the target of said communication. The received pulse trains arrive at the filter means 26 via receiver 24, for filtration of interference and noise and for checking that the information is correct. Indeterminable information received is filtered-out and never reaches the host unit 10. In this regard, the two arrangements 12 communicating with host units have an internal data transmission protocol. The modus operandi of the arrangements 12 is therefore unique and does not incur additional load on the connected host units 10, wherein any additional work required for wireless data transmission is handled by the link 9 that includes the arrangements 12.

35

When the arrangement 12 is constructed in accordance with the second alternative embodiment, the arrangement will prefera-

WQ 97A03532

PCT/SE96/00865

11

bly be portable and capable of being connected to a host unit 10 via the standard I/O ports of the host unit and the arrangement 12, without needing to supplement the host unit with wireless communication software.

It will be understood that the aforescribed embodiments are not intended to limit the scope of the present invention, but merely to illustrate exemplifying applications to one of normal skill in this particular technical field. Accordingly, the number of embodiments conceivable to one skilled in this art is only restricted by the scope of the following Claims.

WO 97/03532

PCT/SE96/00865

12

CLAIMS

1. An arrangement (12) for wireless communication having inbuilt integrated electronics and connected to a host unit (10) via connection means (14), characterized in that the arrangement (12) includes processor-controlled (20) integrated electronics with transmitter means (22) and receiver means (24), wherein said means (22, 24) establish a direct transmission link (9) with other means (22, 24) for wireless pulse transmission and wireless pulse reception respectively, filter means (26) for filtering out disturbance data, interference data, and noise, signal conversion means (28), and input ports and output ports for connection to the host unit (10) via said connection means (14), and wherein the arrangement including said filter means (26) functions as a buffer against the host unit (10) by virtue of the host unit receiving and processing solely data intended therefor, via said connection means (14).
2. An arrangement according to Claim 1, characterized in that the arrangement includes protocol control for data transmission and reception between integrating arrangements (12) and between host units (10), wherein the arrangement (12) converts the received wireless-transmitted data to an alphanumerical character code, which may include control characters for transmission to the host unit, and converting an alphanumerical character code received from the host unit and possibly including control characters into pulses for wireless transmission, wherein the arrangement (12) operates autonomously from the host unit (10) in question with regard to said wireless transmission and its signal conversion (28).
3. An arrangement according to Claims 1 and 2, characterized in that the arrangement (12) with connected host unit (10) is used on an intermittent basis; and in that the host unit (10) continuously uses other existing network connections.

WN 97/03532

PCT/SE96/00865

13

4. An arrangement according to Claims 1 and 2, characterized in that the connected host unit (10) decides when and to what extent the arrangement (12) is used in relation to other existing network connections.

5

5. An arrangement according to Claims 1 and 2, characterized in that the arrangement (12) constitutes the sole communication path for external communication of the host unit (10).

10

6. An arrangement according to any one of Claims 2-5, characterized in that the arrangement is portable and can be connected to a host unit (10) via standard I/O ports on said host unit and said arrangement (12) without needing to supplement the host units with wireless communication software.

15

7. An arrangement according to any one of the preceding Claims, characterized in that the arrangement is integrated in a host unit via connection means (14).

WO 97/03532

PCT/SE96/00865

1/1

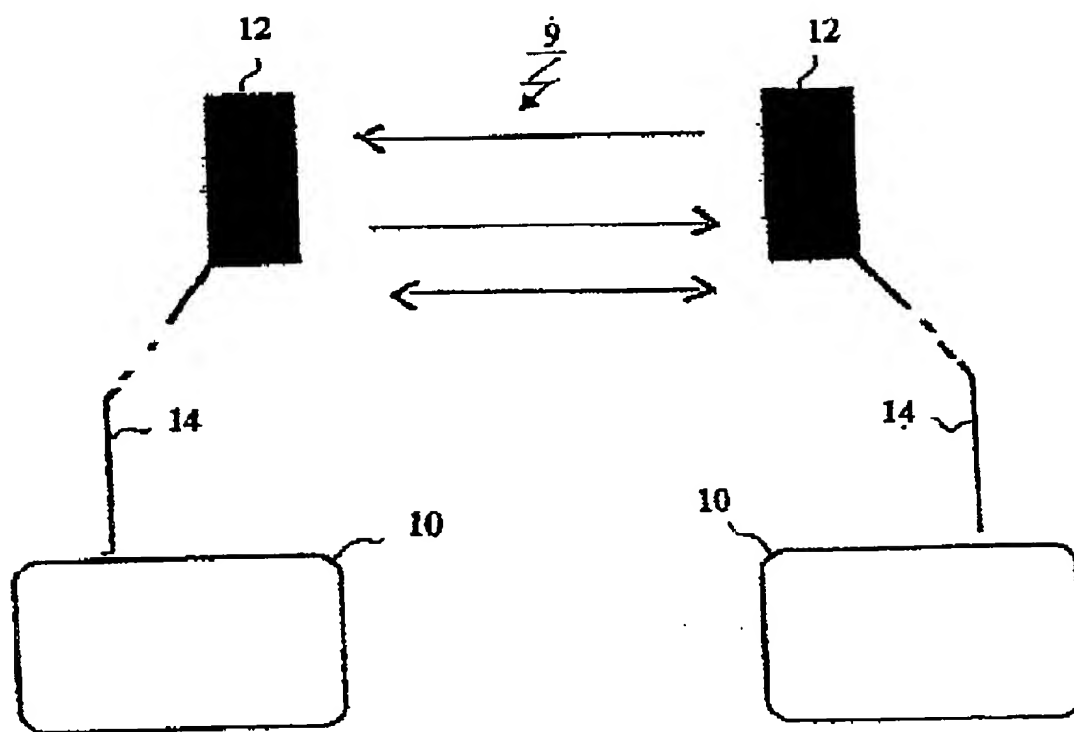


Fig. 1

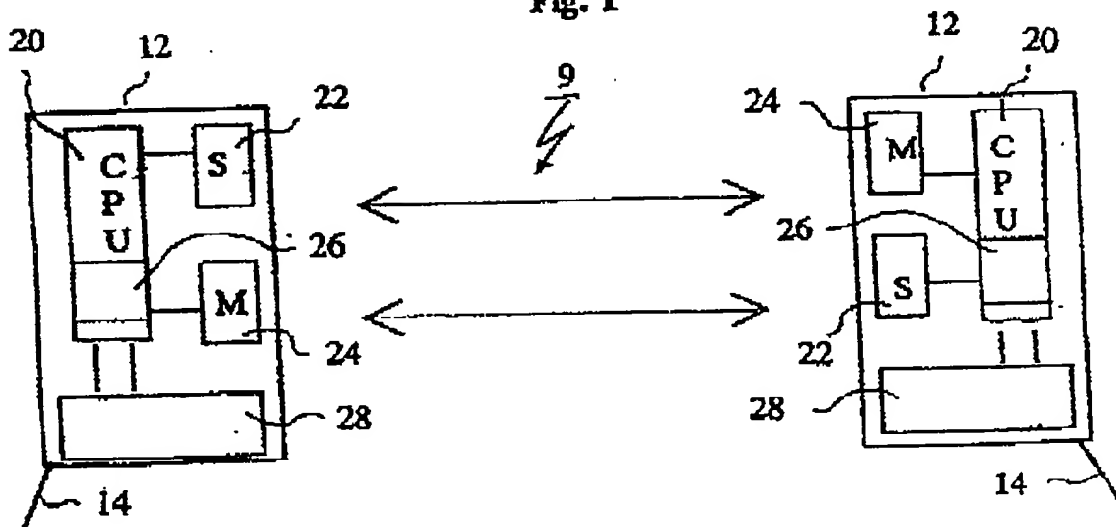


Fig. 2

SUBSTITUTE SHEET

FOR UTILITY/DESIGN
CIP/PCT NATIONAL/PLANT
ORIGINAL/SUBSTITUTE/SUPPLEMENTAL
DECLARATIONS

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CUSHMAN
FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the INVENTION ENTITLED

Arrangements for wireless communications

the specification of which (CHECK applicable BOX(ES))

X -> [] is attached hereto.

BOX(ES) -> [x] was filed on January 7, 1998 as U.S. Application No. 0 /

-> [] was filed as PCT International Application No. PCT/ / on

-> -> and (if U.S. or PCT application amended) was amended on

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. I hereby claim foreign priority benefits under 35 U.S.C. 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application:

PRIOR FOREIGN APPLICATION(S)

<u>Number</u>	<u>Country</u>	<u>Day/MONTH/Year Filed</u>	<u>Date first Laid-open or Published</u>	<u>Date Patented or Granted</u>	<u>Priority Claimed</u> <u>Yes</u> <u>No</u>
9502499-8	Sweden	07 July 1995			X

I hereby claim domestic priority benefit under 35 U.S.C. 119/120/365 of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application.

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S)

<u>Application No. (series code/serial no.)</u>	<u>Day/MONTH/Year Filed</u>	<u>Status</u> <u>pending, abandoned, patented</u>	<u>Priority Claimed</u> <u>Yes</u> <u>No</u>
---	-----------------------------	--	---

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Cushman Darby & Cushman Intellectual Property Group of Pillsbury Madison & Sutro LLP, 1100 New York Avenue, N.W., Ninth Floor, East Tower, Washington, D.C. 20005-3918, telephone number (202) 861-3000 (to whom all communications are to be directed), and the below-named persons (of the same address) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete names/numbers below of persons no longer with their firm and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above firm and/or a below attorney in writing to the contrary.

Paul N. Kokulis	16773	David W. Brinkman	20817	Paul E. White, Jr.	32011	Stephen C. Glazier	31361
Raymond F. Lippitt	17519	George M. Sirilla	18221	Michelle N. Lester	32331	Paul F. McQuade	31342
G. Lloyd Knight	17698	Donald J. Bird	25323	Jeffrey A. Simenauer	31993	Barry L. Grossman	30844
Carl G. Love	18781	W. Warren Taltavull	25647	G. Paul Edgell	24238	Ruth N. Morduch	31044
Edgar H. Martin	20534	Peter W. Gowdey	25872	Lynn E. Eccleston	35861		
William K. West, Jr.	22057	Dale S. Lazar	28872	David A. Jakopin	32995		
Kevin E. Joyce	20508	Glenn J. Perry	28458	Mark G. Paulson	30793		
Edward M. Prince	22429	Kendrew H. Colton	30368	Timothy J. Klima	34852		

1. INVENTOR'S SIGNATURE: Risto R. Laukkanen Date 1998-01-15

Inventor's Name (typed) Risto Laukkanen Swedish
First Middle Initial Family Name Country of Citizenship
Residence (City) Sundsvall (State/Foreign Country) Sweden
Post Office Address (Include Zip Code) Kummelgatan 5, S-853 57 Sundsvall, Sweden

2. INVENTOR'S SIGNATURE: _____ Date _____

Inventor's Name (typed) _____
First Middle Initial Family Name Country of Citizenship
Residence (City) _____ (State/Foreign Country) _____
Post Office Address (Include Zip Code) _____

3. INVENTOR'S SIGNATURE _____ Date _____

Inventor's Name (typed) _____
First Middle Initial Family Name Country of Citizenship
Residence (City) _____ (State/Foreign Country) _____
Post Office Address (Include Zip Code) _____

(FOR ADDITIONAL INVENTORS, check box [] and attach sheet (CDC-116 2) for same information for each re signature, name, date, citizenship, residence and address.)